

## CHAPTER 12

# Natural Systems

### Introduction

Lynchburg residents attach a high value to preserving and enhancing their natural and environmental resources. For many residents, the beauty of the City is an essential part of their quality of life. The City is known for its hills and steep ravines that harbor rich woodlands, wildlife, and rare plants. The James River, Lynchburg's most prominent natural feature, provided the City's early reason for being—a source of water power and a transportation vehicle. Now the James River is becoming the focus for downtown revitalization.



**James River: Pedestrian bridge to Percival's Island nature trail.**

As the City has developed, pressures have increased to build on sensitive natural lands. Citizens have expressed a desire to increase efforts to protect natural and environmental resources and to move toward a more sustainable community. Using such cities as Chattanooga, Tennessee, and Boulder, Colorado, as models, Lynchburg embraces sustainable development, defined as “meeting the needs of the present without compromising the ability of future generations to meet their needs.” The goals, objectives and strategies identified in this element strive to lead Lynchburg towards a more sustainable future by protecting and promoting the City's outstanding natural resources.

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## Context & Recommendations

### *Geology, Topography & Soils*

The natural features of Lynchburg, including the geology, topography, and soils, have a significant impact on the suitability of the land for development. The variable rock types underlying the City have formed the hills and steep ravines of the central city, the imposing Cinders Mountain along the City's southern border, and the foothills of the Blue Ridge Mountains that begin in the Reusens area along the northwest border. Those areas of the City that feature a highly dissected landscape of narrow ridges and steep-sided valleys present a challenge to developers, especially for large retail and industrial buildings needing large areas for parking. Grading of steep slopes can result in significant soil erosion and sedimentation of streams, though to accomplish much additional development in Lynchburg, some steep areas will likely need to be graded.



**Steep slopes such as these are challenging to develop.**

Some areas of the City are so steep that they remain wooded and relatively natural today. Many steep-sided stream valleys harbor a rich diversity of plant and animal life. The amount and extent of forested areas is quite unusual for a city of Lynchburg's size and age. Large areas of woodland remain on Cinders Mountain, in the Tyreeanna area, in the vicinity of the Blackwater Creek Natural Area and Peaks View Park, and in the Cheese Creek and Judith Creek watersheds. These areas have the potential to be connected to create a natural greenways system that builds on the success of the Blackwater Creek Natural Area.

### *Water Resources*

Lynchburg is drained by 11 streams. Judith, Pigeon, Blackwater, Fishing, and Opossum Creeks all drain directly to the James River, while Ivy, Cheese, Tomahawk, Burton, and Dreaming Creeks are tributaries of Blackwater Creek. By far, Blackwater Creek has the largest watershed area affecting the City and extending into neighboring Bedford and Campbell counties.

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Over the years, City staff and citizens have noticed an increase in flood levels in the City streams, both the frequency of bank overflow and flood elevations. The increased impact of floods appears to be due to increased urbanization of stream watersheds, not only in the City, but also in neighboring counties. City engineers and planners note that the City's FEMA 100-year floodplain maps, published in 1983, are no longer accurate and recommend that they be updated. While the City has permitted development to occur in the 100-year floodplain in the past, it should limit new development in the floodplain in the future and seek to protect existing development that may be affected by flooding.



**Blackwater Creek: One of eleven creeks in Lynchburg.**

The water quality of Blackwater, Ivy, and Fishing Creeks, and the James River has been found to violate the state and federal water quality standard for fecal coliforms, which indicates contamination from human or animal wastes. Fecal coliform levels exceed the standards to the extent that the Virginia Department of Environmental Quality (DEQ) has placed these streams on the priority list of impaired waters pursuant to Section 1313(d) (1) of the Federal Clean Water Act. Lynchburg's combined sewer system overflows (CSOs) have been identified as the primary source of this contamination. The City's project to separate sewage from stormwater flows, the Combined Sewer Overflow (CSO) project, is designed to address the problem. The DEQ will be performing special studies, called Total Maximum Daily Load (TMDL) studies, to determine if there are any other actions that will need to be taken to reduce fecal coliform counts. But beyond these efforts, other water quality concerns will need to be addressed in the future.

The DEQ is seeking voluntary cooperation from localities in the effort to reduce nutrient (phosphorus and nitrogen) and sediment pollution as part of the James River Tributary Strategy. For communities above the fall line like Lynchburg, the focus will be on the reduction of erosion and sedimentation. The James River Tributary Strategy is one element of a multi-state effort to improve the water quality and to protect the important living resources of the Chesapeake Bay. The

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EPA and the DEQ will also require the City by 2003 to adopt standards and implement mitigation measures to address stormwater quality, the so-called Phase II National Pollution Discharge Elimination System stormwater requirements. The City and Bedford County have obtained a regional stormwater management grant that will explore efficient methods for controlling stormwater quantities and for meeting these new stormwater quality requirements. It is likely that the City's efforts to address stormwater quality will reduce sediment pollution and therefore assist the DEQ in fulfilling the goals for the James River Tributary Strategy.

***Air Quality & Noise Issues***

The DEQ indicates that Lynchburg's air quality meets federal standards, though not all regulated air pollutants are monitored in the City. The EPA revised the standard for ozone in 2000, making it more difficult to meet. If the DEQ places an ozone monitor in Lynchburg in the future, there is a possibility that the City will not meet the standard and will have to prepare and implement a plan to address ozone pollution.

Noise, odors, and light emissions are environmental concerns for some citizens, though detailed data on these pollutants is not readily available.

***Understanding the Value of Natural Systems***

There is a keen interest among citizens in improving the environmental quality of Lynchburg and protecting its natural resources. The first step in protecting these resources is to understand their value in providing a healthy environment. Monitoring and managing the environmental resources within the City can require a significant amount of resources. As stated in Chapter 5, Citywide Land Use & Development, the City needs to improve its capacity to monitor, analyze, and report on local conditions, including environmental and natural resources. The City should develop a natural systems/environmental database to understand existing conditions and monitor future environmental health. Many cities and counties across Virginia are developing environmental databases in their GIS systems to help them plan sustainable, environmentally sensitive communities. Most cities map topography, soils, water bodies, floodplains and parks.

The City should also designate a City staff person to serve as an Environmental Management Coordinator, to maintain and monitor the environmental database and to prepare annual reports on the state of the City's environmental health, for distribution to City officials, staff, residents, and others in the region. Initial environmental reports could be based on existing data and expanded as the GIS and other data systems are improved.

City officials and citizens could benefit from more comprehensive information about effective environmental protection techniques. City staff, including the Environmental Management Coordinator, should be kept abreast of environmental



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trends and practices through training, conferences, workshops, and other educational forums. The City needs to establish a Natural Systems/Environmental Resources Advocacy Committee of local experts to monitor trends in environmental science. The advisory group could be composed of representatives from the Robert E. Lee Soil and Water Conservation District, Friends of Lynchburg Stream Valleys, local colleges and universities, and others.

***Evaluating Human Activities***

Currently, the City does not have an effective tool for evaluating the impacts of development proposals on environmental resources. Residents have expressed a strong desire for a mechanism to evaluate development impacts. One possible method would be for the staff to develop a simple environmental checklist to be applied to all public and private development proposals including rezonings, conditional use permits, site plans, and subdivision plans. The checklist would help evaluate the potential positive and negative effects of development proposals. More detailed evaluations may be required on projects that have a significant impact on environmental resources. Staff should, therefore, develop a process for reviewing these types of impacts more closely. The completed environmental checklists and detailed environmental analyses should be compared to economic and fiscal impact reports and incorporated into staff reports to the Planning Commission and City Council. The environmental checklists and analyses should also be used to update the natural systems/environmental database.

The City needs to establish a set of environmental performance standards for private and public development activities. The standards should be based upon adopted local, state, and federal requirements and cover such issues as air emissions; pollutant discharges; stormwater, erosion, and sediment controls; light, noise, and odor emissions; steep slopes; floodplains; and wetlands; among others. By having environmental performance standards in place, the City can require the modification, redesign, or replanning of proposed development projects.

***Resource Management & Protection***

The City desires to improve the protection and management of its natural systems in order to create a truly sustainable community. There are a number of approaches that the City may choose to pursue, including environmental performance standards, incentives for private actions, education and awards programs, and direct City actions.

As described above, it is important for the City to consider environmental performance standards for new development and redevelopment, not only to ensure compliance with state and federal standards, but also to address the protection and management of important natural resources. Through the application of reasonable standards limiting the development of floodplains, wetlands and streamside steep

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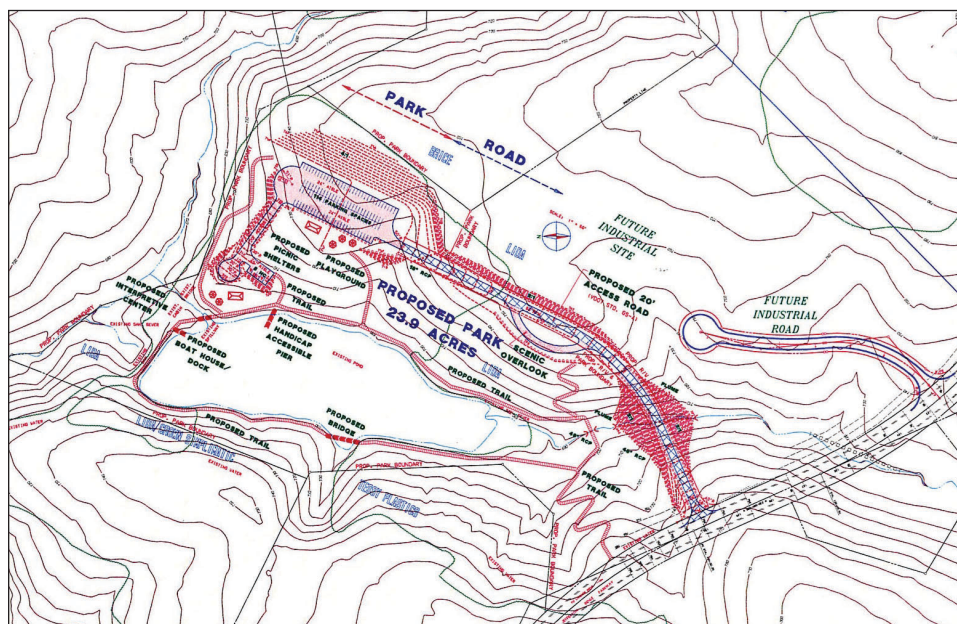
slopes, these important resources could be preserved. Standards for the construction and maintenance of stormwater management facilities would ensure that flooding levels are kept in check and that the water quality of stormwater discharges is addressed. A major concern raised by citizens is the design, quality, and upkeep of stormwater management facilities. During the Community Character Survey, poorly functioning stormwater management facilities received some of the lowest rankings. Maintenance and upkeep of such facilities are directly linked to their effectiveness in managing stormwater.



**Poorly landscaped (left) and well-landscaped (right) stormwater management facilities.**

Incentives, rather than codified standards, may be more appropriate for other efforts to achieve sustainable development. For example, the City should continue to promote the recycling and re-use of existing buildings and offer incentives for the cleanup and redevelopment of brownfield sites, including tax abatement, density/intensity increases, and contributions to infrastructure and public amenities. Density increases or other incentives for private developers should be available in a variety of zoning districts, not just the Traditional Neighborhood Development and Planned Unit Development zones, in exchange for the preservation of significant wooded open space, unique species areas or critical habitats, and for green building design.

The City should also employ softer techniques for natural resource protection such as educational programs and programs to recognize private environmental initiatives. The City is planning to develop an environmental education center at Lynchpin Nature Center that would demonstrate environmental protection and green building techniques. The City should also install interpretive signage along the trail systems of the James River and Blackwater Creek to educate the public about water, wetlands, and riparian land protection. Education and awareness programs should be used to promote the eradication of invasive plant species, such as kudzu, Japanese honeysuckle, and purple loosestrife. The City's park naturalists could work with landowners, community groups (e.g., Boy Scouts and Girl Scouts), and others, as well as offering special awards for eradication efforts. Developers who make special efforts to incorporate green building techniques, protect stream valley woodlands, or otherwise build sustainably could be recognized through an annual awards program. A number of communities in Virginia use awards programs to promote green development.



Department of Parks &amp; Recreation

**Design for the proposed Lynchpin Nature Center to be located in the Lynchpin Industrial Center.**

Finally, the City itself could become actively involved in natural resource protection and management. When the City constructs a building, a parking lot, a road, or a park, for example, it should strive to protect wooded areas, steep slopes, and floodplains to the extent feasible. The City should use green building techniques and demonstrate well-landscaped stormwater management facilities that not only serve as best management practices, but also provide visually pleasing amenities. Citizens in public meetings voiced a great deal of support for City establishment of a greenway program to expand the James River Heritage Trail and the Blackwater Creek Natural Area and to establish similar areas along other City streams. The greenway program should promote the purchase and accept donations of open space for resource protection along streams. The City could also use environmental performance standards to obtain the dedication of stream valley open space for the greenway program in developing and redeveloping areas. The Resource Conservation Areas identified on the Future Land Use Map and described in Chapter 5, Citywide Land Use & Development, outline what a fully implemented greenway system might look like.

### ***A Regional Approach***

Since nature does not respect political boundaries, regional cooperation is essential in addressing environmental problems and managing natural systems. The expansion of existing partnerships should be encouraged to address regional environmental issues such as stormwater (in progress), greenways, scenic resources, water and air quality, and invasive species. Collaboration between state agencies, local and regional environmental groups, and colleges and universities may prove

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more effective in addressing resource protection and management. The regional stormwater management effort is a good example of environmental planning that extends across jurisdictions and utilizes grant funds from the Virginia Department of Conservation and Recreation. The City should continue to pursue other funding opportunities to monitor and manage environmental resources.

Information about the health of the natural systems in the City and region is dispersed among various groups, and data collection is currently a cooperative effort. There is no local repository for information. Information-sharing responsibilities and data collection protocols should be established between the various groups so that an annual report on the state of the City's and region's natural systems and environmental health can be produced.

## **Goals, Objectives & Strategies**

**Goal 1. Promote an understanding of the value of natural systems (geology, landforms, vegetation, wildlife, air, water, noise, and energy, among others) in providing a pleasant, healthy, and safe environment for human activity.**

**Objective 1.A. Education.** Increase awareness of environmental health issues, including those associated with the region's air and water quality, among City officials, staff, and citizens—both individual and corporate.

- 1) Designate a City staff person (the Environmental Management Coordinator) to prepare and maintain the natural systems/environmental databases and prepare reports.
- 2) Publish an annual report on the state of the City's and region's natural systems and environmental health for distribution to City officials, staff, residents, and others in the region. The initial reports should be based on existing data and expanded as the GIS and other databases are improved. Use of the Internet and other technologies to distribute the report should be maximized to the greatest extent possible to reduce paper waste.
- 3) Demonstrate effective environmental protection and "green" building techniques at the proposed environmental education center at Lynchpin Nature Center and/or at other venues.
- 4) Provide environmental education opportunities that highlight the James River through interpretive signage and programs along the James River Heritage Trail and in the downtown riverfront parks.

**Goal 2. Evaluate the potential effects, both positive and negative, of human activities (such as new development, redevelopment, installation of infrastructure, and resource use and disposal, among others) on natural systems.**

**Objective 2.A. Training & Education.** Keep abreast of trends in environmental science to better understand the potential effects of development on natural systems.

- 1) Establish a Natural Systems/Environmental Resources Advisory Committee of local experts to monitor trends in environmental science.
- 2) Provide training and conference opportunities for the City's Environmental Management Coordinator.
- 3) Offer workshops and training sessions for City officials, staff, developers, and citizens on effective environmental protection and "green" building techniques.

**Objective 2.B. Environmental Impact Methodologies.** Improve methodologies, practices, and procedures for assessing the environmental impacts of development proposals.



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- 1) Develop a simple environmental checklist for screening proposed projects for potentially significant environmental effects. Apply this checklist to all rezonings, conditional use permits, site plans, and subdivision plans.
- 2) Establish methodologies for more detailed evaluation of potentially significant environmental impacts identified through use of the checklist.
- 3) Require private developers to prepare more detailed analyses for significant environmental impacts identified through use of the checklist.
- 4) Prepare detailed analyses for City projects that show potentially significant environmental impacts through use of the checklist.
- 5) Incorporate the environmental checklists and detailed environmental analyses in staff reports to the Planning Commission and City Council so that environmental impacts can be directly compared with economic and fiscal impact reports on projects.
- 6) Pursue the development of more accurate maps of the City's 100-year floodplains so that the impacts of development on floodplains can be assessed more accurately.

**Goal 3. Temper and refine human activities to promote and enhance the value of natural systems.**

**Objective 3.A. Development Standards.** Improve environmental standards for private and public development activities.

- 1) With input from the Natural Systems/Environmental Resources Advisory Committee, prepare a set of environmental performance standards for private and public development projects that address such issues as:
  - Air emissions, based on state standards and local plans.
  - Pollutant discharges into water resources, based on state standards and regional and local plans.
  - Phase II National Pollution Discharge Elimination System Stormwater Program.
  - James River Tributary Strategy.
  - Total Maximum Daily Load Impaired Waters Plans.
  - Erosion and sediment controls based on state and local standards.
  - Noise exposure limits based on Federal Highway Administration standards.
  - Light emissions, odors, energy use and efficiency, water consumption and solid waste disposal, based on local standards.
  - Natural features, including steep slopes, floodplains, and tree cover, based on local standards.
  - Wetlands, based on U.S. Army Corps of Engineers standards.
- 2) Consider adoption of the environmental performance standards as either policies or regulations after public input.

**Objective 3.B. Analyses.** Use environmental analyses to modify, redesign, or replan entirely proposed developments to ensure the City's environmental health.

- 1) Apply environmental performance standards to reduce negative environmental effects.
- 2) If environmental analyses show significant adverse effects even after application of standards, then modify, redesign, or replan projects to reduce the effects, based on the recommendations of the analyses.
- 3) Consider environmental tradeoffs or offsets for economic development projects deemed essential to the City.

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### **Goal 4. Manage natural systems to improve the health and enjoyment of future generations.**

**Objective 4.A. Incentives.** Develop incentive programs for the private preservation of important environmental resources.

- 1) Offer density/intensity increases and/or other incentives to private developers for the preservation of significant wooded open space, unique species areas, and critical habitats; for “green” building design; and for environmental remediation within not only the Planned Unit Development and Traditional Neighborhood Development zoning districts, but also other zoning districts.
- 2) Continue to promote the adaptive re-use of existing buildings, as a form of recycling.
- 3) Offer incentives for the cleanup and redevelopment of “brownfield” sites, for example, density/intensity increases, tax abatements, and City contributions of infrastructure and public amenities.
- 4) Establish a program to promote the donation of open space easements to the City or a private land trust, showing the tax benefits that apply. The program should address only land recommended for open space preservation on the Future Land Use Map.
- 5) Promote the eradication of invasive plant species through education and awards programs or other incentives.

**Objective 4.B. Protection.** Protect and manage important environmental resources.

- 1) Establish a greenway program to expand the James River Heritage Trail and Blackwater Creek Natural Area and to establish similar areas along other City streams:
  - Apply performance standards protecting floodplains, wetlands, and streamside steep slopes to development projects.
  - Organize a program to purchase and accept donations of open space land for natural resource protection and passive recreational use along streams.
- 2) Protect important natural resources on City-owned land:
  - Refrain from filling or developing in the 100-year floodplain and in wetlands, except as required for water resource and passive recreational projects. For the latter type of project, impacts on floodplains and wetlands should be minimized to the greatest extent possible.
  - Limit development of steep slopes adjacent to streams, floodplains, and wetlands.
  - Protect wooded areas, unique vegetation areas, and critical habitats to the greatest extent possible.
  - Protect scenic resources, such as City parks, the Old City Cemetery, and Point of Honor.
  - Eradicate invasive plant species on City-owned properties.
- 3) Apply “green” building techniques to new and renovated City buildings.
- 4) Work with neighboring jurisdictions to develop a regional stormwater management program that addresses both water quality and quantity (flooding) within watersheds, and to design stormwater facilities to be attractive visual assets rather than eyesores.
- 5) Monitor the water quality impacts of the CSO project and implement water quality improvement plans for other TMDL impaired streams as they are designated.
- 6) Take advantage of water quality improvement fund (WQIF) grants that are available from the Virginia Department of Conservation and Recreation (e.g., the recently approved regional stormwater management grant for the City of Lynchburg and Bedford County).
- 7) Monitor the air quality standard attainment status of the City and the region, as determined by the state, particularly with respect to ozone, and develop an appropriate nonattainment plan as necessary.
- 8) Expand public/private clean-up programs to remove trash and debris from stream valleys and ravines.

### **Goal 5. Promote regional cooperation in managing natural systems.**

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**Objective 5.A. Partnerships.** Build partnerships in managing natural systems.

- 1) Continue to expand partnerships with the following agencies, governments, and groups to address regional environmental issues:
  - Region 2000 Regional Commission
  - Robert E. Lee Soil and Water Conservation District
  - Adjoining counties
  - State agencies, including DEQ, DCR, and VDOT
  - Colleges and universities
  - Local and regional environmental groups
  - Citizen and business volunteers
- 2) Identify issues that are best addressed on a regional basis, such as:
  - Stormwater management (Grant in progress)
  - Greenways (James River Heritage Trail planning in progress)
  - Air quality
  - Invasive plant species eradication
  - Scenic resources protection

**Objective 5.B. Information Collection.** Improve methods for collecting and sharing environmental information.

- 1) Work with regional partners to establish responsibilities and protocols for environmental data collection.
- 2) Distribute the annual report on the state of the City's and region's natural systems and environmental health to regional partners.
- 3) Use the Internet and other technologies to broadcast information widely and to minimize paper waste.

**Objective 5.C. Regional Cooperation.** Initiate regional cooperative efforts with demonstration projects.

- 1) Support current regional stormwater management planning and greenways efforts.
- 2) Expand regional environmental planning efforts to other topic areas, such as air quality, invasive plant species eradication, and scenic resource protection, over time as success is demonstrated.



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